

METHODS OF MANAGING MULTIGENERATIONAL HUMAN RESOURCES IN THE ERA OF THE FOURTH INDUSTRIAL REVOLUTION – RESEARCH RESULTS

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Purpose: The research objective of the article was to identify the differences arising from the digital competencies of different generations that are highlighted in companies undergoing digital transformation. The purpose of the application was to try to match methods and instruments that would support managers in managing human resources from different generations.

Results: Special attention was paid to recommending management methods and instruments that compensate for digital competence gaps in older generations and relational gaps in younger generations.

Research limitations/implications: The research was conducted using a survey technique. The questionnaire was distributed through a platform designed for marketing research. This distribution channel for the questionnaire package may have limited access to the research for older generation employees. Future surveys should be conducted using direct messages or direct contact with the interviewer.

Practical implications: The results of the research highlighted the integrative role of managers in organizations where employees come from different generations. The findings underscore the importance of each employee having a sense of his or her place in the organization. The results are an inspiration for managers to appreciate the value of multi-generational personnel in the era of Industry 4.0.

Social implications: Intergenerational differences regarding worldview, human ontology, value system, prevailing norms and rules of social coexistence have accompanied humanity since time immemorial. In the current situation, these differences are exacerbated by technological advances. Building intergenerational relations at the professional level based on resentment and antagonism is not appropriate. The role of managers of organizations where employees come from different generations is to make everyone feel their place in the organization and appreciate the value of their work. The task of managers is to build an organizational culture based on dialogue, mutual understanding, openness to diversity and exposure to the resources that each employee brings to the organization.

Originality/value: The addressee of the work is the manager of a company with multi-generational employees. The novelty of the consideration is the formulation of recommendations that serve managers of companies undergoing digital transformation to adapt to the requirements of Industry 4.0.

Keywords: Human resources management, multigenerationality, Industry 4.0.

1. Introduction

Groups of workers in EU occupations vary in the level and prevalence of digital competencies they possess. According to research published by the European Commission, the lack of basic digital competencies is mainly found among older generations. And the Alpha generation is about to enter the labor market. The Alpha generation is a group of people born from 2010 to about 2025. Alpha is growing up in a society where technology is an integral part of their lives. Smartphones, tablets, video games and artificial intelligence are a daily reality for them. Due to the COVID-19 pandemic, the Alpha generation is even more accustomed to working remotely than other generations. Managing each successive generation of employees makes new demands. Managing increasingly younger generations requires adjusting the instruments used within the methods (management methods through communication, delegation, motivation, goals, building and nurturing organizational culture). It seems particularly important to match management methods and instruments with personnel coming from the youngest generations. These groups have the highest digital competencies and at the same time considerable deficits in interpersonal relations. The reason for the article is the recognized research gap on recommending methods for managing human resources in the era of the fourth industrial revolution. A survey of recent global literature (publications from 2017-2024) focused on the 4.0 competencies of multigenerational and multicultural workforce. The literature on the Fourth Industrial Revolution is mainly concerned with the implementation of technology, change management in a transforming enterprise. Meanwhile, there is a lack of publications on the support of HR managers in this difficult period of digital transformation of enterprises. Recognizing this research gap, a research question was posed, viz: What management methods to recommend in a multi-generational work environment in the era of the fourth industrial revolution? What instruments used within management methods to recommend in a multi-generational work environment in the era of the fourth industrial revolution? The research objective of the article was to identify the differences arising from the digital competencies of different generations, which are highlighted in companies undergoing digital transformation. The application goal was to try to match methods and instruments that would support managers in managing human resources coming from different generations. Particular importance was attached to recommending management methods and instruments that compensate for digital competence gaps in older generations and relational competence gaps in younger generations.

The own research presented in this article was preceded by a systematic literature review (see Stawiarska et al., 2024), after which generational diversity (which must be taken into account by a manager using selected management methods during the digital transformation of an enterprise) was found. The premise of the presented study was that: “generational diversity is mainly concerned with digital and relational competencies” and “a manager can, using known management methods with new instrumentation, effectively compensate for identified competency gaps”.

2. Literature review

Technologies introduced into the business processes of enterprises require new predispositions and skills from human resources. Selected literature studies have analyzed the key dimensions: education and qualifications of employees (Benesova et al., 2017); key employee skills required of workers in the era of the fourth industrial revolution. In addition to the need for competence in digitization, AI, robotics and big data (Sima et al., 2020), soft skills (Pejic-Bach et al., 2020), a disposition for continuous training (Flores et al., 2020) and flexibility and a collaborative attitude (Matt et al., 2020) are essential. Some studies have looked at the relationship between social trends and Industry 4.0 technologies (Bednar, Welch, 2020). Researchers have highlighted the changing demographics of the workforce in the context of Industry 4 challenges (Calzavara et al., 2020; Javaid, Haleem, 2020). The researchers, seeing that the demographics of the workforce are changing (there is a general aging of the population and a higher average age of the workforce worldwide), found it worthwhile to study the relocation and distribution of work (remote and smart work) in this context (Calzavara et al., 2020).

Other works have emphasized that the introduction of Industry 4.0 systems and technologies entails opportunities and pitfalls for organization and management (Benesova, Tupa, 2017; Nahavandi, 2019; Xu et al., 2021). Like any transition to a new production paradigm, a new organization of business processes, leadership styles and personnel management methods is required. Educating and qualifying managers (Benesova et al., 2017); managing human-machine interaction, i.e., the connections between the mind of a (human) worker and the (artificial) intelligence of robots to increase collaboration and reduce competition is a new challenge for managers (Nahavandi, 2019; Xu et al., 2021). Extreme connectivity between organizations, employees, workers and robots in a digitized organization creates new social power structures. Previous management methods, may no longer be acceptable in digitally transformed enterprises, may lead to various personnel problems, authoritarian rule by one person. Few researchers argue that new management methods should be proposed in the social sciences and humanities for effective and efficient implementations of Industry 4.0 and 5.0 technologies (Dezi et al., 2018; Ozdemir, 2018) especially in multi-generational environments.

3. Research Methodology

The next chapter presents the results of secondary and primary data research (i.e., collected through a prepared questionnaire). The secondary data research (European Commission, Digital Economy and Social Index 2020) showed generational differences in digital competencies in different countries and jobs. Conducting further research, it was determined that the subject of the study would be only specialists of industrial enterprises coming from different generations. The specialists were selected using the quota purposive selection method. That is, they had to meet the criteria in order to be surveyed (their job position had to be called a specialist for..., they had to be employed at an industrial enterprise). Quota selection for this study meant that specialists from all generations X, Y, Z were surveyed in amounts proportional to the total number of employees in the labor market. However, in the end, after the sample size was set at 150 people, it was decided to keep the same number of respondents in groups belonging to generations X, Y, Z. The research method was a statistical method. The research technique was a survey, the research tool was a prepared survey questionnaire. Distribution of the questionnaire was done through the gogle portal (<https://www.google.pl/intl/pl/forms/about/>). Preparing the research tool was guided by the study's goal of wanting to recognize the differences arising from the digital competencies of different generations, which are highlighted in companies undergoing digital transformation.

In preparing the survey tool, an attempt was also made to confirm the assumptions that: “generational diversity is mainly about digital and relational competencies” and “a manager can use familiar management methods with new instrumentation to effectively compensate for identified competency gaps”. Data collection lasted from May to June 2023. Analysis of the collected data is presented in the chapter: Research results.

4. Research results

The following charts show that in the working environment of many EU countries, a digital competence gap of cadres is emerging compared to the cadres of the countries - leaders of the ranking. Figure 1 shows the Ranking of EU countries according to the Digital Economy and Digital Society Index (DESI, 2000).

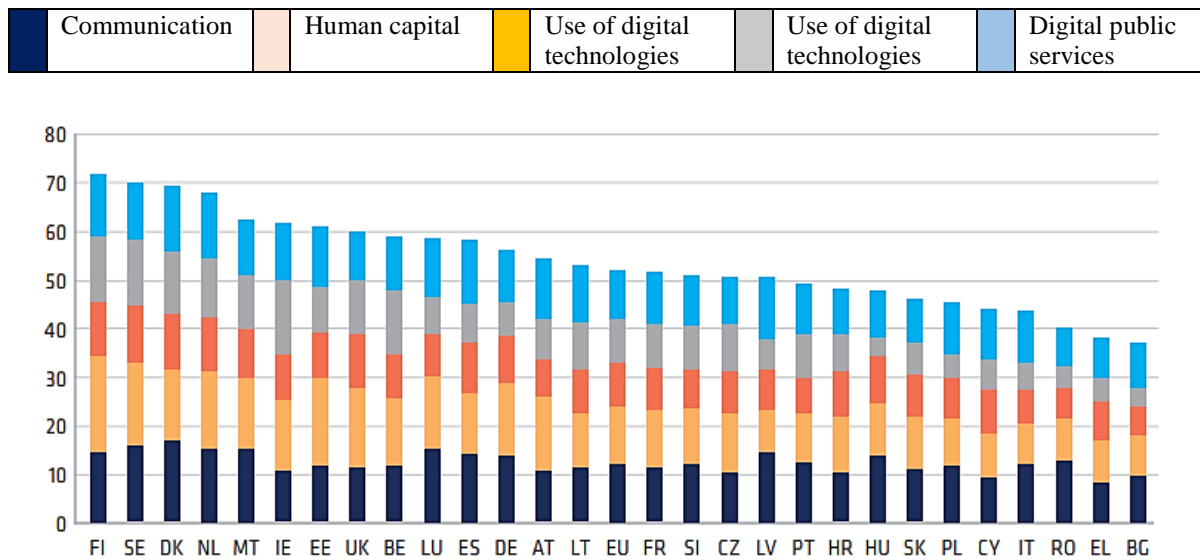


Figure 1. Ranking of EU countries according to the digital economy and digital society index (DESI, 2000).

Source: the European Commission, Digital Economy and Social Index (DESI), 2020, https://arp.pl/documents/41/Kompetencje_cyfrowe_ARP_part_I.pdf

Figure 2 shows the assessment of digital competence of residents in the European Union countries.

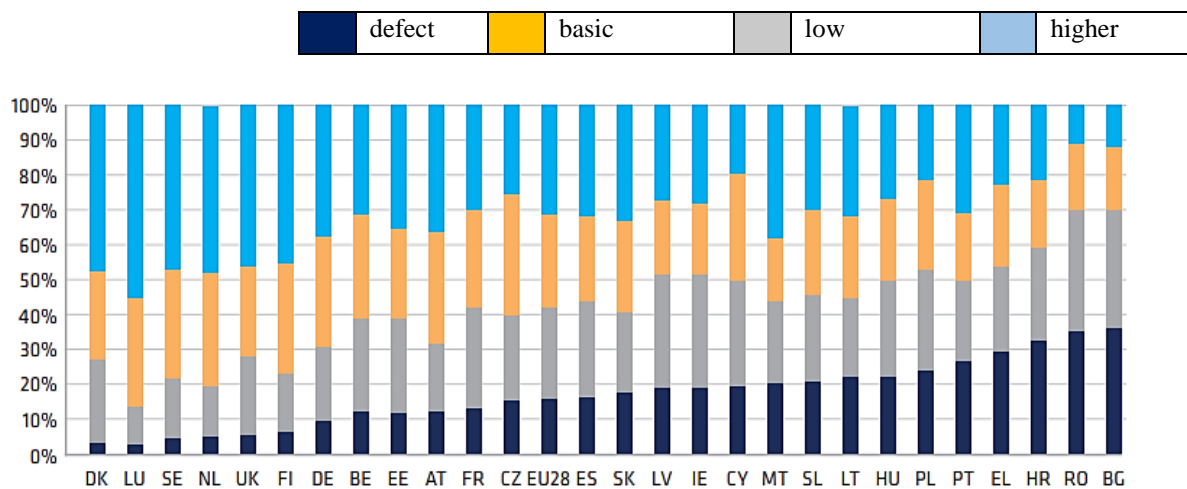


Figure 2. Assesses the digital competence of residents in the European Union countries.

Source: the European Commission, Digital Economy and Social Index (DESI), 2019, https://arp.pl/documents/41/Kompetencje_cyfrowe_ARP_part_I.pdf

Table 2 shows the assessment of digital competence of EU employees of selected professions by level of competence.

Table 2.

Evaluation of digital competencies of EU employees of selected professions (by level of competence)

Occupation performed	Competence level	Percentage of employees (%)
Manager	Basic	8,3
	Advanced	18,7
	Specialized	23,3
Specialist	Basic	38,4
	Advanced	8,9
	Specialized	10,3
Technician	Basic	40,5
	Advanced	9,8
	Specialized	11,8
Office worker	Basic	56,8
	Advanced	13,2
	Specialized	14,1
Machine operator	Basic	27,5
	Advanced	7,1
	Specialized	4,7
Worker	Basic	35,1
	Advanced	7,5
	Specialized	5,7

Source: the European Commission, Digital Economy and Social Index (DESI), 2016, https://arp.pl/documents/41/Kompetencje_cyfrowe_ARP_part_I.pdf

The evaluation of the competence of industrial enterprise specialists by level of sophistication shows that 38.4 percent of them declare basic digital competence, only 10.3 percent of specialists evaluate their digital competence as specialized.

Table 3 shows the evaluation of digital competencies of Polish residents against the EU in age ranges.

Table 3.

Assessment of digital competencies of Polish residents against the EU in age brackets

Age range (years)	Digital competences (%)					
	Low		Basic		Specialized	
	EU	PL	EU	PL	EU	PL
16-24	15	14	25	37	57	48
25-34	21	23	29	38	46	35
35-44	27	37	29	30	36	24
45-54	30	39	29	22	27	11
55-64	31	31	25	14	16	5
65-77	26	20	18	6	7	2
Total populations	26	28	26	25	31	21

Source: https://arp.pl/documents/41/Kompetencje_cyfrowe_ARP_part_I.pdf

The table presented does not show an assessment of the digital competence of professionals employed by industrial companies by generational groups. However, the population data presented in the table confirms quite a disparity in the digital competencies of different age groups.

The following Table 4 presents the qualifications and skills important from the point of view of an Industry 4.0 employee.

Table 4.*Qualifications and skills important from the point of view of an Industry 4.0 worker*

Knowledge of information and communication technologies	Ability to work with data
<ul style="list-style-type: none"> • Basic IT knowledge • Ability to use and interact with intelligent machines • Understanding of machine-to-machine communications, data protection and cybersecurity 	<ul style="list-style-type: none"> • Ability to process and analyze data received from machines • Understanding of data entry, visualization and decision making processes • Basic knowledge of statistics
Know-how techniczne	Personal skills
<ul style="list-style-type: none"> • Interdisciplinary and generic knowledge of technologies • Specialized and generic knowledge of factory operations and production processes • Technical know-how about the machines necessary to operate them 	<ul style="list-style-type: none"> • Ability to adapt in the workplace and readiness for change • Ability to work in a team and willingness to share knowledge • The ability to change the way of thinking under the influence of science

Source: Aulbur, Arvind, 2016.

A study of the literature (Stawiarska et al., 2019, 2021, 2024) made it possible to prepare Table 4. Table 5 groups the competencies of the 4.0 specialist employee so that the manager can support/develop them using specific management methods.

Table 5.*Management methods, and developing new competencies of the employee*

Management method by:	Qualifications and skills important from the point of view of an Industry 4.0 employee and developed by the management method
communicating	<ul style="list-style-type: none"> • communication competences using instant messengers • the ability to use and interact with computers and intelligent machines • data protection and cybersecurity understanding/skills
delegation of authority	<ul style="list-style-type: none"> • interdisciplinary and generic knowledge of technologies and know-how about machines necessary to operate them • specialized and generic knowledge of factory operations and production processes • ability to make decisions regarding digital transformations
motivating	<ul style="list-style-type: none"> • ability to adapt in the workplace and plan development in the context of digital transformation • readiness for changes regarding digital transformation / involvement in the digital transformation process • creativity in implementing increasingly better digital solutions
goals	<ul style="list-style-type: none"> • ability to analyze and process data received from machines • ability to enter visualization data and make decisions based on data • generic knowledge of business statistics
building organizational culture	<ul style="list-style-type: none"> • ability to adapt in the workplace and readiness for change • ability to work in a team and willingness to share knowledge • the ability to change the way of thinking under the influence of science

Source: own elaboration.

The following takes a closer look at each of the management methods, attempts to identify new 4.0 instrumentation that can support the chosen method, and presents the results of our own research (based on primary data obtained through a questionnaire).

5. Management by communication – Essence of the method

The main features of this method are: exposure in the organizational structure of the company of positions and cells oriented to information and communication processes; the use in the company of a rich spectrum of various methods and technical means of information and communication; improvement of information and management processes leading to the improvement of the existing information and communication system in the company. The method assumes the broad participation of employees at various levels (from the highest - the company's board of directors and management, through the managers of functional departments, to the positions of specialists in various fields) supporting the operation of the information system. In the era of Industry 4.0, an important emphasis in the application of this method is on the use of information technology as a tool to support communication, generation and processing of data, scheduling of work and measurement of its effects (Nowicki, 1998). New competencies developed by applying this method (with the use of modern ITC technology tools) are:

- communication competence using instant messaging,
- ability to use and interact with computers and smart machines,
- understanding/skills regarding data protection and cyber security.

The results of the self-assessment of specialists - employees of industrial enterprises are presented in Tables 6-8.

Table 6.

Self-assessment results of specialists - employees of industrial enterprises on communication competence using instant messaging

How do you assess your communication competences using instant messengers?						
degree	Generation X		Generation Y		Generation Z	
Basic	1	20	1	3	1	0
Advanced	2	18	2	39	2	5
Specialized	3	12	3	8	3	45
Weighted arithmetic mean	1,84		2,1		2,9	

Table 7.

Results of self-assessment of specialists - employees of industrial enterprises regarding the ability to use computers and intelligent machines and the ability to interact with them

How would you rate your ability to use and interact with computers and intelligent machines?						
degree	Generation X		Generation Y		Generation Z	
Basic	1	11	1	18	1	30
Advanced	2	23	2	19	2	15
Specjalized	3	16	3	13	3	5
Weighted arithmetic mean	2,1		1,9		1,5	

Table 8.

Results of self-assessment of specialists - employees of industrial enterprises regarding understanding/skills of data protection and cybersecurity

How do you rate your understanding/skills regarding data protection and cybersecurity?						
degree	Generation X		Generation Y		Generation Z	
Basic	1	45	1	30	1	32
Advanced	2	5	2	15	2	16
Specjalized	3	0	3	5	3	2
Weighted arithmetic mean	1,1		1,5		1,4	

6. Management by delegation of authority - Essence of the method

Management by delegation of authority should properly be defined as the delegation of authority, duties and responsibilities (Niemczyk, 2000) and be included among the methods of motivating employees. The essence of delegation is the transfer of specific decision-making capabilities along with the burden of these decisions to lower levels of management (Niemczyk, 2000). By bestowing a task on an employee, a manager simultaneously manifests trust. Thus, he builds the employee's sense of worth and raises the desire for self-development. It allows the employee to identify with the results of the project and build awareness that the role performed/decision made in the implementation of a given project was important for the proper functioning of the company (Timescu-Dumitrescu, 2019). In the era of Industry 4.0, an important emphasis in the application of this method is the use of integrated information systems of the MRP, DRP, CRM classes, where the decision maker on any issue marks it in the system with his/her marker/signature. New technology in support of transparency of responsibility, confirming personally who made the decision, confirming the input of work is

blockchain. New competencies developed by applying the method of management by delegation (with the use of modern technology tools of Industry 4.0) are:

- interdisciplinary and generic knowledge of the technologies and machine know-how necessary to operate them,
- specialized and generic knowledge of factory operations and production processes,
- ability to make decisions on digital transformation.

The results of the self-assessment of specialists - employees of industrial enterprises are presented in Tables 9-11.

Table 9.

Self-assessment results of specialists - employees of industrial enterprises on interdisciplinary and generic knowledge of technologies and know-how about machines necessary to operate them

How would you rate your comprehensive and ever-expanding knowledge of the technologies and machine know-how necessary to operate them?						
degree	Generation X		Generation Y		Generation Z	
Basic	1	15	1	10	1	28
Advanced	2	25	2	22	2	17
Specjalized	3	20	3	28	3	4
Weighted arithmetic mean	2,5		2,76		1,48	

Table 10.

Results of self-assessment of specialists - employees of industrial enterprises regarding specialized and generic knowledge about activities and production processes in the factory

How do you rate your comprehensive and constantly deepened knowledge of factory activities and processes?						
degree	Generation X		Generation Y		Generation Z	
Basic	1	1	1	10	1	32
Advanced	2	5	2	35	2	16
Specjalized	3	44	3	5	3	2
Weighted arithmetic mean	2,86		1,9		1,4	

Table 11.

Results of self-assessment of specialists - employees of industrial enterprises regarding the ability to make decisions related to digital transformation

How do you rate your ability to make decisions regarding digital transformations in your company?						
degree	Generation X		Generation Y		Generation Z	
Basic	1	45	1	30	1	36
Advanced	2	5	2	15	2	10
Specjalized	3	0	3	5	3	4
Weighted arithmetic mean	1,1		1,5		1,36	

7. Management by motivation – Essence of the method

Management by motivation aims to make employees perform tasks with the impact of various incentives. There are many different approaches and ways to motivate employees, such as rewards, employee evaluations and punishment systems. It is also important to understand the needs and goals of employees and create a motivational system that is suitable for them. The effectiveness of a motivational system depends on employee preferences (Gellerman, 1968). Meeting the motivational needs of employees is a challenging task for a manager managing a multi-generational workforce. It is important to keep in mind that each employee may respond differently to motivational stimuli, which often becomes a test of managerial creativity. Employees also differ in terms of temperament, experience, qualifications, character traits (Buchbinder, Shanks, 2007). Motivation involves providing the employee with the right stimulus/motivation to address a need. By providing the right motive that will elicit a productive and engaging attitude, the manager raises the chances of valuable results. In the era of Industry 4.0, an important emphasis in the application of this method is the use of incentive systems based on gamification. There is also the use of mobile applications for the coworking community introducing interesting solutions, comparing the results of different employees. Motivation, especially for the younger generation, has become a widely understood support for rebuilding interpersonal relationships. The new competencies developed by applying the management-by-motivation method are:

- adaptability in the workplace and development planning in the context of digital transformation,
- readiness for change regarding digital transformation/commitment to the digital transformation process,
- creativity and competition in implementing better and better digital solutions.

The results of the self-assessment of specialists - employees of industrial enterprises are presented in Tables 12-14.

Table 12.

Self-assessment results of specialists - employees of industrial enterprises on adaptability in the workplace and development planning in the context of digital transformation

How do you assess your ability to adapt in the workplace and plan for growth in the context of digital transformation?						
degree	Generation X		Generation Y		Generation Z	
Basic	1	10	1	5	1	42
Advanced	2	19	2	15	2	4
Specjalized	3	11	3	30	3	4
Weighted arithmetic mean	1,62		2,5		1,24	

Table 13.

Results of self-assessment of specialists - employees of industrial enterprises on readiness for change regarding digital transformation / commitment to the process of digital transformation

How would you rate your readiness for change regarding digital transformation / commitment to digital transformation?						
degree	Generation X		Generation Y		Generation Z	
Basic	1	31	1	12	1	2
Advanced	2	15	2	25	2	16
Specjalized	3	4	3	5	3	32
Weighted arithmetic mean	1,46		1,54		2,6	

Table 14.

Results of self-assessment of specialists - employees of industrial enterprises regarding creativity in implementing better and better digital solutions

How do you rate your creativity in implementing better and better digital solutions?						
degree	Generation X		Generation Y		Generation Z	
Basic	1	45	1	30	1	20
Advanced	2	5	2	15	2	16
Specjalized	3	0	3	5	3	14
Weighted arithmetic mean	1,1		1,5		1,56	

8. Management by objectives – The essence of the method

Management by objectives is a method of building a coherent set of objectives for all cells and participants in an organisation and assessing the level of performance (Carrolls, 1978). The supervisor and his or her subordinates are supposed to be in agreement on the objectives that will apply over a set period of time. In the era of Industry 4.0, an important emphasis in the application of this method is the use of analytical systems using large data sets from inside from outside the company. Some of the data used comes from beacons operating with BLE technology others from satellites operating with GPS technology, others from KPA KPIs generating information based on artificial intelligence (Przegieliński, Jemielniak, 20023; Marr, 2022). The new competencies developed by applying the Management by Objectives method are:

- the ability to analyse and process data received from machines,
- the ability to input data visualisation and to make decisions based on the data,
- generic knowledge of business statistics.

The results of the self-assessment of specialists – employees of industrial enterprises are presented in Tables 15, 16 and 17.

Table 15.

Self-assessment results of specialists – employees of industrial enterprises on the ability to analyse and process data received from machines

How do you rate your ability to analyze and process data received from machines?						
degree	Generation X		Generation Y		Generation Z	
Basic	1	0	1	5	1	32
Advanced	2	5	2	10	2	16
Specjalized	3	45	3	35	3	2
Weighted arithmetic mean	2,9		2,6		1,4	

Table 16.

Results of self-assessment of specialists - employees of industrial enterprises regarding the ability to enter data visualization and make decisions based on data

How do you rate your ability to enter data, visualize and make decisions based on data?						
degree	Generation X		Generation Y		Generation Z	
Basic	1	25	1	20	1	30
Advanced	2	15	2	15	2	15
Specjalized	3	10	3	15	3	5
Weighted arithmetic mean	1,5		1,9		1,5	

Table 17.

Results of self-assessment of specialists - employees of industrial enterprises regarding generic knowledge of business statistics

How do you rate your knowledge of business statistics?						
degree	Generation X		Generation Y		Generation Z	
Basic	1	45	1	30	1	42
Advanced	2	5	2	15	2	6
Specjalized	3	0	3	5	3	2
Weighted arithmetic mean	1,1		1,5		1,2	

9. Management by means of organisational culture - Essence of the method

The success and broadly understood results of a company's activities depend not only on the managerial skills of its management and its material and financial resources. They also depend on the difficult-to-define atmosphere, the style of conduct, the company's development history, its technical level, the management style, the demographic and psychological characteristics of the employees, the adopted patterns of conduct, together they form what is referred to as organisational culture. Considerations by many authors have shown that organisational culture influences the management methods used (Kinar, 2022) and, conversely, the management methods used shape organisational culture. Organisational culture is also built by the values a manager holds. In the era of Industry 4.0, remote working, open innovation, digital twins of production processes, the building of e-culture must be addressed (Bulińska-Stangrecka H. (2018). An important emphasis in the application of the management method using e-culture is on the formation of the values of the virtual organisation, in which the social responsibility of employees is emphasised. In an open, dynamic virtual organisation, the manager encourages enables and watches over the safe sharing of knowledge, encourages creative work, inspires risk-taking behaviour, all through intelligent information systems (Pol, 2022).

New competences developed throughNew competences developed through the use of this method are:

- ability to adapt in a digital workplace and readiness for digital change,
- ability to work in a team on digital solutions and willingness to share knowledge,
- ability to change one's way of thinking under the influence of learning.

The results of the self-assessment of specialists - employees of industrial enterprises are presented in Tables 18, 19 and 20.

Table 18.

Self-assessment results of specialists - employees of industrial enterprises on adaptability in the digital workplace and readiness for digital change

How would you rate your ability to adapt in a digital workplace and your readiness for digital change?						
degree	Generation X		Generation Y		Generation Z	
Basic	1	10	1	5	1	32
Advanced	2	19	2	15	2	14
Specjalized	3	11	3	30	3	4
Weighted arithmetic mean	1,62		2,5		1,44	

Table 19.

Results of self-assessment of specialists - employees of industrial enterprises regarding the ability to work in a team on digital solutions and the willingness to share knowledge

How do you rate your ability to work in a team on digital solutions and your willingness to share knowledge?						
degree	Generation X		Generation Y		Generation Z	
Basic	1	19	1	5	1	34
Advanced	2	10	2	15	2	12
Specjalized	3	11	3	30	3	4
Weighted arithmetic mean	1,44		2,5		1,4	

Table 20.

Results of self-assessment of specialists - employees of industrial enterprises regarding the ability to change the way of thinking under the influence of science

How do you rate your ability to change your way due to learning?						
degree	Generation X		Generation Y		Generation Z	
Basic	1	10	1	5	1	12
Advanced	2	19	2	15	2	24
Specjalized	3	11	3	30	3	14
Weighted arithmetic mean	1,62		2,5		2,04	

Table 21 contains the summary results of the analyzes collected in tables 6-20.

Table 21.

Analysis of the competences of multigenerational staff in the context of the use of selected management methods in the era of Industry 4.0

Management method by:	Employee qualifications and skills desired in the era of Industry 4.0, and developed thanks to the use of the method	Self-assessment of specialists (employees of industrial enterprises) by generation		
		X	Y	Z
communicating	communication competences using instant messengers	1,84	2,1	2,9
	the ability to use and interact with computers and intelligent machines	2,1	1,9	1,5
	data protection and cybersecurity understanding/skills	1,1	1,5	1,4
Average rating		1,68	1,83	1,93
delegation of authority	interdisciplinary and generic knowledge of technologies and know-how about machines necessary to operate them	2,5	2,76	1,48
	specialized and generic knowledge of factory operations and production processes	2,86	1,9	1,4
	ability to make decisions regarding digital transformations	1,1	1,5	1,36

Cont. table 21

Average rating		2,15	2,05	1,41
motivating	ability to adapt in the workplace and plan development in the context of digital transformation	1,62	2,5	1,24
	readiness for changes regarding digital transformation / involvement in the digital transformation process	1,46	1,54	2,6
	creativity in implementing increasingly better digital solutions	1,1	1,5	1,56
Average rating		1,47	1,83	1,8
goals	ability to analyze and process data received from machines	1,62	2,5	2,24
	ability to enter visualization data and make decisions based on data	1,46	1,54	2,6
	generic knowledge of business statistics	1,1	1,5	1,2
Average rating		1,39	1,85	2,06
building organizational culture	ability to adapt in the workplace and readiness for change	1,62	2,5	1,44
	ability to work in a team and willingness to share knowledge	1,44	2,5	1,4
	the ability to change the way of thinking under the influence of science	1,44	2,5	2,4
Average rating		1,5	2,5	1,62

10. Discussion

A systematic review of the literature confirmed that the digital technologies being implemented into companies require new digital competences from human resources (Benesova et al., 2017). It was also confirmed (by analysis of secondary and primary data), following Sima et al., 2020; Pejic-Bach et al., 2020; Matt et al., 2020, that there are differences between generations not only in the possession of digital competences, but also in relational competences. Researchers who highlighted the changing demographics of the workforce in the context of the challenges of Industry 4.0 (Calzavara et al., 2020; Javaid, Haleem, 2020) inspired the article's premise that: 'generational diversity is mainly about digital and relational competences'.

In contrast, those who emphasized that the introduction of Industry 4.0 systems and technologies entails opportunities and pitfalls for organizations and management (Benesova, Tupa, 2017; Nahavandi, 2019; Xu et al., 2021), inspired the establishment of another premise of the article that, 'and "the manager can, using familiar management methods with new instrumentation effectively compensate for identified competence gaps". In seeking recommendations for managers to utilize management methods for the multi-generational workforce of digitally mourning enterprises, they were guided by the research of Nahavandi, 2019; Xu et al., 2021 and their own research conducted among professionals of industrial enterprises.

11. Conclusions

Managing multi-generational people can present both opportunities and challenges due to the different needs for communication, delegation, motivation, goal-setting or values that determine the construction of a company culture.

Here are some tips for effectively managing staff from different generations:

- Recognize that each generation has unique experiences, values and communication preferences shaped by the events of their formative years.
- Familiarize yourself with the characteristics of the generations remaining in the labor market, such as Generation X, Generation Y and Generation Z.
- Adapt the method of management by communication used to their preferences regarding communication channels and style of message.
- If the company is undergoing a digital transformation, know that generation Z is best equipped to communicate using the tools of Industry 4.0 (the average score for a generation Z professional coming from an industrial company is 1.93 points out of 3 possible - see Table 19). However, digging deeper into the evaluation criteria used in the research, it should be noted that Generation Y scores better in the self-assessment ‘ability to use and interact with computers and intelligent machines’.
- When delegating authority, duties and responsibilities, consider that each generation has different experience, seniority and knowledge.
- If a company is undergoing a digital transformation, know that generation X is best placed to delegate authority to make important transformational decisions. This is because they rate highly on their ‘specialist and generic knowledge of factory operations and processes’. So X should be on the decision-making team. Y delegate authority because they rated themselves high on their ‘interdisciplinary and generic knowledge of the technologies and machine know-how necessary to operate them’ and ‘ability to make digital transformation decisions’. The self-assessment shows that Z are not yet ready to delegate difficult transformation decisions to them.
- Use the management-by-motivation method. It seems to be a universal principle that achievements should be recognized and that conditions should be created to enable continuous professional development of employees.
- If a company is undergoing a digital transformation, know that Generation Y professionals adapt best in the workplace and identify with the planned digital development, but the highest rated motivator for Z is: ‘readiness for change regarding digital transformation/commitment to the digital transformation process’ and “creativity in implementing better and better digital solutions”.

- When managing over goals distribute them, taking into account the experience and knowledge that older generations bring, and create opportunities for knowledge sharing and mentoring.
- Formulate measurable goals, clearly articulate objectives and provide regular feedback on the evaluation of goal achievement.
- Remember, it is also your job to set goals for individual employees. Make your job easier and manage your staff effectively by collecting and analyzing data. Data on performance, employee satisfaction or motivation, will allow you to make more informed personnel decisions. The use of analytical tools supports the identification of areas for improvement and optimizes the allocation of human resources.
- If your company is undergoing a digital transformation, know that Generation Z professionals rated best for their ‘ability to input data, visualize and make decisions based on data’, but to Y they still have the best ‘ability to analyses and process data received from machines’ and ‘generic knowledge of business statistics’.
- Promote a culture of continuous learning to attract the attention of younger generations who may value professional development opportunities. Be open to flexible working arrangements, being aware that younger generations may value work-life balance and flexible schedules. Allow for a variety of working styles, as some may prefer a collaborative environment, while others may excel in a more independent setting. Promote intergenerational integration. Encourage an inclusive environment where all team members feel valued, regardless of age. Avoid making assumptions and stereotypes based on age. Treat individuals as unique contributors with diverse skills and perspectives. Encourage collaboration and inclusion in decision-making processes. Ask for feedback from different age groups to ensure that different perspectives are considered when making important decisions. Emphasize a common purpose: Connect the team through a common purpose or mission that transcends generational differences. Help individuals see how their unique contributions contribute to the overall success of the team or organization. By acknowledging and accepting the differences between team members, you can create a more inclusive and collaborative work environment that leverages the strengths of each generation.
- If your business is undergoing a digital transformation, know that Generation Y professionals adapt best in the workplace and are ready for change; they will be the bridge between the digitally conventional X experience and the digitally creative but apprehensive Generation Z.

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